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Coal link to lung disease: Study

SMITA BHATTACHARYYA

Jorhat, May 23: Scientists of the biotechnology division of CSIR — Northeast Institute of Science and Technology (NEIST) here have done a gene expression study of people living in the vicinity of coal mines to find out how much they are prone to develop chronic obstructive pulmonary disease (COPD).

The study is important as projections made in the Global Burden of Disease Study state that COPD is one of the leading causes of mortality globally and by 2020 it is expected to rise to third position as a cause of death and in fifth position as the cause of disability-adjusted life years.

The study was conducted by Tapan Dey, Kabita Gogoi, Bala Gopalan Unni, Munmi Kalita, Moonmee Bharadwaz, Pranab Kumar Boruah, Thaneswar Bora, Dibyajyoti Ozah and Manoj Kalita of NEIST, and Minakshi Bhattacharjee of the biotechnology department of University of Science and Technology, Meghalaya.

Factors such as ethnicity and smoking status were also taken into consideration in the study of 70 people who had the disease diagnosed by doctors according to American Thoracic Society guidelines, and 85 non-COPD living in the vicinity of the Ledo coal mine area in Tinsukia district.

B.G. Unni, chief scientist of the biotechnology division of NEIST said the study proved that those without the mu class of glutathione S-transferase gene were at more risk of developing the disease as these acted like antioxidants in cleansing the lungs from respirable particulate matters.

"The glutathione S-transferase group of genes is a superfamily. There are different (total 13) classes of this gene named alpha, beta, gamma, mu, theta and such like. We did the experiments taking the theta and mu class of the gene. These classes of the gene are the most important for the disease to occur and we found out the mu class gene mutation is the basic cause of the disease," Unni said.

From among the 575 subjects surveyed from the study site and the overall disease symptoms reported like fever, frequent cough and cold, weakness, and high blood pressure, only 155 subjects visited the nearest mini PHC at Ledo during the period of January 2012 to January 2013. Of these, about 45.1 per cent was suffering from COPD-related respiratory symptoms.

"Taking into consideration smoking and environmental factors in genetically susceptible individuals we found that those produced more enzymes were better able to deal with the ill-effects of inhaling respirable particulate matter, sulphur dioxide and nitrogen dioxide present in coal dust than those who did not. In fact, it was seen that many other factors like chloro-fluoro compounds present in coal dust also seem to be playing a role in the disease progression," Unni said.

Explaining why coal dust was a factor in disease progression, Tapan Dey, another NEIST scientist, said the chloro-fluoro compounds were organic compounds and not particles. "With the help of Fourier transform infrared spectroscopy we found out that there is a higher concentration of these compounds in coal dust-laced air as compared to air at non-polluted sites. So, we came to the conclusion that these compounds may also be an environmental factor for disease progression," Dey said.

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